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## (54) RESINOUS FILM FOR LIGHT REFLEX

## (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a resinous film for light reflex having superior light reflecting efficiency and high luminance and a member of a backlight unit for liquid crystal display, a backlight unit for liquid crystal display, etc.

**SOLUTION:** The resinous film for light reflex is produced from a resin composition containing at least a thermoplastic resin (A), a filler (B) and a mixture (C) of silicones having siloxane bonds as skeletons as essential components.

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CLAIMS

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## [Claim(s)]

[Claim 1] The film made of resin for light reflexes characterized by being manufactured from thermoplastics (A), a bulking agent (B), and the resin constituent that contains at least 3 components of the mixture (C) of the silicone which makes siloxane association a frame as an indispensable component.

[Claim 2] The mixture (C) of silicone with which a resin constituent makes a frame a bulking agent (B) 100 – the 400 weight sections, and siloxane association to the (Thermoplastics A) 100 weight section, the film made of resin according to claim 1 for light reflexes which it comes to make into 0.01 – 20 weight section to the 100 weight sections of two components of thermoplastics (A) and a bulking agent (B).

[Claim 3] The film made of resin according to claim 1 or 2 for light reflexes whose thermoplastics (A) is polyolefine system resin or polyester system resin.

[Claim 4] The film made of resin given in any 1 term of claim 1 thru/or claim 3 which is at least one or more sorts chosen from the group which a bulking agent (B) becomes from a calcium carbonate, a barium sulfate, titanium oxide, a magnesium carbonate, an alumina, and a magnesium hydroxide for light reflexes.

[Claim 5] The film made of resin given in any 1 term of claim 1 thru/or claim 4 whose mixture (C) of the silicone which makes siloxane association a frame is silicone oil for light reflexes.

[Claim 6] The film made of resin given in any 1 term of claim 1 thru/or claim 5 with which the processing aid or softener (D), and ultraviolet ray absorbent (E) other than three components with an indispensable resin constituent are blended for light reflexes.

[Claim 7] The film made of resin given in any 1 term of claim 1 thru/or claim 6 which is at least one or more sorts chosen from the group which processing aid or a softener (D) becomes from the hydrocarbon polymer which has an ester compound, an amide compound, and a side chain, mineral oil, and a wax for light reflexes.

[Claim 8] The film made of resin given in any 1 term of claim 1 thru/or claim 7 which is that whose thickness uniaxial stretching of the film made of resin for light reflexes is carried out at least, and is 20–500 micrometers for light reflexes.

[Claim 9] The film made of resin given in any 1 term of claim 1 thru/or claim 8 whose film made of resin for light reflexes is 25 – 70% of void contents for light reflexes.

[Claim 10] It is the film made of resin for light reflexes whose at least one layer of a multilayer film the multilayer film more than a bilayer comes to constitute the film made of resin for light reflexes, and is a film made of resin given in any 1 term of claim 1 thru/or claim 9 for light reflexes.

[Claim 11] The layered product characterized by coming to carry out the laminating of the film made of resin of a publication for light reflexes to any 1 term of claim 1 thru/or claim 10 at a metal plate.

[Claim 12] The light reflex plate of the liquid crystal display back light section which uses the film made of resin given in any 1 term of claim 1 thru/or claim 10 for light reflexes as a configuration layer.

[Claim 13] The light reflex member of the lamp holder section of a liquid crystal display which

uses the film made of resin given in any 1 term of claim 1 thru/or claim 10 for light reflexes as a configuration layer.

[Claim 14] The liquid crystal display back light unit which uses the film made of resin of claim 1 thru/or any 1 term according to claim 10 for light reflexes as a configuration layer.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

#### [0001]

[Field of the Invention] This invention relates to the film made of resin for light reflexes. It is related with the film made of resin for light reflexes, and the film made of resin for light reflexes used especially suitable for the member of a liquid crystal display, the back light unit of a liquid crystal display, etc. in more detail.

#### [0002]

[Description of the Prior Art] In recent years, the film made of resin for light reflexes is used in various fields. For example, it is used for PDA, such as television, and a personal computer, a cellular phone, and a video camera as main parts of a liquid crystal display. The thing of a small power consumption mold is liked with the thin shape by this kind of liquid crystal display. And since it considers as the thin shape, the side light method which is a transparent light guide plate and has arranged the light source horizontally is adopted. However, a part of quantity of light in which the back light unit using a light guide plate goes via a light guide plate gets across to the liquid crystal section, but when the remaining quantity of lights use a reflecting plate, it is told to the liquid crystal section. Therefore, in order to tell efficiently the quantity of light which enables small power consumption-ization of a liquid crystal display, and attains miniaturization and thin shape-ization, and is supplied from a back light unit to the liquid crystal section, the light reflex effectiveness of the film for light reflexes must be high, and desire of the film for light reflexes of high brightness is carried out.

[0003] As a conventional film made of resin for light reflexes, the light reflex film of the reflecting plate which applied white pigments on metal plates, such as aluminum, and the product made from the polyethylene terephthalate (it abbreviates to PET hereafter) sheet containing the inorganic bulking agent of white which is indicated by JP,59-8782,A is proposed as indicated by JP,2-13925,A. However, with the film for light reflexes of these proposals, since light was reflected with the pigment, sufficient light reflex effectiveness was not acquired. Moreover, the film for light reflexes which made the PET film indicated by JP,63-161029,A and the film which uses PET as a principal component extend did not have an enough light reflex in the interface of PET and a hole, although light was reflected by the hole formed at the time of extension other than the light reflex effectiveness by the pigment. moreover, the thermoplastics and the inorganic bulking agent which are indicated by JP,7-287110,A — since — the becoming porous film is superior to the thing before this. However, it could not say that light reflex effectiveness was enough, but the film for light reflexes which improved from that of light reflex effectiveness was demanded strongly.

#### [0004]

[Problem(s) to be Solved by the Invention] The purpose of this invention solves these problems and is to offer the film made of resin for light reflexes which demonstrates the further excellent light reflex effectiveness and high brightness and the member of the back light unit for liquid crystal displays, the back light unit for liquid crystal displays, etc.

#### [0005]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the

film made of resin for light reflexes characterized by manufacturing this invention from thermoplastics (A), a bulking agent (B), and the resin constituent that contains at least 3 components of the mixture (C) of the silicone which makes siloxane association a frame as an indispensable component is offered.

[0006]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail. Let [ thermoplastics / [it may be hereafter called the (A) component for short] ] the film made of resin for light reflexes concerning this invention be a base. (A) As thermoplastics which constitutes a component, acrylic resin, such as polyolefine system resin, such as polyethylene, polypropylene, and a Polly 4-methyl pentene, polyester system resin, and polymethylacrylate, polyvinyl chloride system resin, polyvinylidene chloride system resin, fluororesin, polyether system resin, polyamide system resin, polyurethane system resin, the diene system resin represented by polybutadiene are mentioned.

[0007] The polyolefine system resin from a viewpoint and polyester system resin of the workability of a film or a sheet (it is only hereafter called a "film" for short) are desirable among the above-mentioned thermoplastics. As an example of polyolefine system resin, linearity low density polyethylene (it abbreviates to LLDPE hereafter), polypropylene (it abbreviates to PP hereafter), etc. which are the copolymer of low density polyethylene, high density polyethylene, medium density polyethylene, ethylene, and alpha olefin are mentioned, and polyethylene terephthalate (PET), polybutylene terephthalate, etc. are mentioned as an example of polyester system resin.

[0008] The following resin is desirable when the shaping stability of these thermoplastics etc. is taken into consideration. That is, when resin is LLDPE, the thing for 0.1-20g / 10 minutes has a desirable melt flow rate (MFR) in 190 degrees C and 2.16kg load. When resin is PP, the thing for 0.5-15g / 10 minutes has desirable MFR in 230 degrees C and 2.16kg load. When resin is PET, the thing of the range of 0.65-0.85 has desirable intrinsic viscosity.

[0009] (A) In case the whiteness degree of a film is raised when a resin constituent is processed into a film, and a film is extended, function [ bulking agent / which is blended with a component / [it may be hereafter called the (B) component for short] ] on a film as making a hole form. (B) As long as a component makes the suitable hole for the film after raising the whiteness degree of a film and extending form, it may be any of an inorganic bulking agent and an organic bulking agent. In addition, the part which exfoliation arose in the interface of the (A) component and the (B) component, and became a hole is said by this invention by a "hole's" carrying out melting kneading, film-izing a resin constituent, and extending this film.

[0010] As an inorganic bulking agent, a calcium carbonate, talc, clay, a kaolin, a silica, \*\*\*\*\*\*, a magnesium carbonate, a barium carbonate, magnesium sulfate, a barium sulfate, a calcium sulfate, an aluminum hydroxide, a zinc oxide, a magnesium hydroxide, a calcium oxide, magnesium oxide, titanium oxide, an alumina, a mica, asbestos powder, glass powder, milt balun, a zeolite, \*\*\*\* clay, etc. can accomplish. As an organic bulking agent, cellulose system powder, such as wood flour and pulp powder, is mentioned. A calcium carbonate, a barium sulfate, titanium oxide, a magnesium carbonate, an alumina, a magnesium hydroxide, etc. are desirable especially. Two or more kinds of these (B) components may be mixed.

[0011] (B) The thing 30 micrometers or less of a component which has small mean particle diameter is desirable, and especially its thing of the range of 0.1-10 micrometers is desirable especially. If compactness of the hole produced in an oriented film is worsened and particle size is too small, the dispersibility to a resin constituent is bad, and since the moldability of a resin constituent is also reduced, neither is desirable [ if mean particle diameter is too large, after manufacturing a film from a resin constituent, it will extend, but ].

[0012] In case the above-mentioned (B) component manufactures a film from prevention of condensation, the dispersibility to the (A) component, and a resin constituent, it is desirable that surface treatment is carried out by the finishing agent from viewpoints at the time of extending especially to at least 1 shaft orientations, such as ductility. As a finishing agent, a fatty acid or its metal salt is mentioned.

[0013] (A) Adequate supply in the blender and extruder at the time of manufacturing a film from

a resin constituent is enabled, and function [ mixture / of the silicone which makes a frame siloxane association blended with a component / {it may be hereafter called the (C) component for short} ] as raising the rate of a light reflex of a film. (C) As a component, you may be any of silicone oil, silicone rubber, and silicone resin.

[0014] As an example of silicone oil, dimethylpolysiloxane (dimethyl silicone oil), What [ consists of only the siloxane structures and the alkyl groups like a poly methylphenyl siloxane and annular dimethylpolysiloxane ] The epoxy denaturation silicone oil to which the alkyl group denaturalized by various kinds of functional groups, Amino denaturation silicone oil, polyether denaturation silicone oil, Carboxyl denaturation silicone oil, alcoholic denaturation silicone oil, Methacrylic denaturation silicone oil, methyl styryl silicone oil, Fluorine denaturation silicone oil, mercapto silicone oil, methyl styryl denaturation silicone oil, higher-fatty-acid denaturation silicone oil, and methyl alkoxy denaturation silicone oil are mentioned.

[0015] As silicone rubber, the millable rubber of heating bridge formation (HTV), liquid rubber, the liquid rubber of room temperature curing (RTV), etc. are mentioned. Moreover, the copolymer of the monomers which have siloxane siloxane structures, such as a dimethylsiloxane methyl steer ROKISHI siloxane copolymer, and the denaturation silicone rubber (SEP) which denaturalized ethylene-propylene rubber by special polyorganosiloxane are mentioned. Moreover, the polymer of a trimethylsiloxy silicic acid etc. is mentioned other than usual dimethylpolysiloxane as silicone resin.

[0016] Although the resin constituent for the film manufacture for light reflexes made of resin concerning this invention contains the three above-mentioned components as an indispensable component at least, it can blend an anti-oxidant and a thermostabilizer, light stabilizer, lubricant, an antifogger, an antblocking agent, an antistatic agent, a slip inhibitor, etc. [ ultraviolet ray absorbent / softener / the resin additive of further others, for example, processing aid, / {it may be hereafter called the (D) component for short} / {it may be hereafter called the (E) component for short} ]

[0017] Processing aid or a softener [(D) Component] is used in order to raise the workability at the time of manufacturing a film from a resin constituent. Specifically, specific ester compounds, amide compounds, the hydrocarbon polymers that have a side chain, mineral oil, and waxes are mentioned.

[0018] As long as it is the monochrome or polyester of structure which consists of alcohol and a carboxylic acid as an ester compound, the compound with which the compound which there is not and left hydroxyl and a carbonyl group end to intramolecular was also blocked in the form of an ester group is sufficient as especially a limit. Specifically, stearyl stearate, sorbitan tristearate, epoxy soybean-oil, purification castor oil, hardening castor oil, dehydrated-castor-oil, epoxy soybean-oil, extreme hardened-oil, and trimellitic acid trioctyl, ethylene glycol JIOKUTANOETO, pentaerythritol tetra-octanoate, etc. are mentioned.

[0019] As long as it is the monochrome or polyamide compound of structure which consists of an amine and a carboxylic acid as an amide compound, the compound with which the compound which there is not and left the amino group and a carbonyl group end to intramolecular was also blocked in the form of an amide group is sufficient as especially a limit. Specifically, octadecanamide, a behenic acid amide, hexa methylenebis octadecanamide, a trimethylene bis-octylic acid amide, hexa methylenebis hydroxy octadecanamide, a trio KUTATORI merit acid amide, a distearyl urea, butylene bis-octadecanamide, xylylene bis-octadecanamide, a distearyl adipic-acid amide, a distearyl phthalic-acid amide, a distearyl OKUTADEKA diacid amide, the Epsilon caprolactams, and these derivatives are mentioned.

[0020] The thing which are the Pori alpha olefins and has a with a carbon numbers of four or more side chain as a hydrocarbon polymer which has a side chain and which is usually classified into oligomer is desirable. Specifically The copolymer and its maleic-acid derivative of an ethylene-propylene For example, (the Mitsui Petrochemical Industries, Ltd. make and trade name:roux cant), the polymer of an isobutylene For example, (the Idemitsu petrochemical-industry company make, trade name:polybutene HV-100), The oligomer of a butadiene and an isoprene and its water garnish, the polymerization object of 1-hexene, The derivative and hydroxy polybutadiene which are guided from the polymerization object of polystyrene and these,

the water garnish, an end hydroxy polybutadiene water garnish (for example, the Mitsubishi Chemical make, a trade name: polytail HA), etc. are mentioned. A liquid paraffin, paraffin wax, etc. are mentioned as mineral oil.

[0021] Generally an ultraviolet ray absorbent [(E) Component] is chosen from a salicylic-acid system, a benzophenone system, or a benzotriazol system ultraviolet ray absorbent. As a salicylic-acid system ultraviolet ray absorbent, a phenyl SARISHI rate, a p-t-butylphenyl SARISHI rate, p-octyl phenyl SARISHI rate, etc. are mentioned. As a benzophenone system ultraviolet ray absorbent, 2, 4-dihydroxy benzophenone, 2-hydroxy-4-methoxybenzophenone, 2-hydroxy-4-octoxybenzophenone, 2, 2'-dihydroxy-4-methoxybenzophenone, etc. are mentioned. As a benzotriazol system ultraviolet ray absorbent, 2-(2'-hydroxy-5'-methylphenyl) benzotriazol, 2-(2'-5'-t-butylphenyl) benzotriazol, etc. are mentioned. An ultraviolet ray absorbent is not limited to what was illustrated.

[0022] As an anti-oxidant, a mono-phenol system, a bisphenol system, a macromolecule mold phenolic antioxidant, a sulfur system anti-oxidant, the Lynn system anti-oxidant, etc. are mentioned. As light stabilizer, a hindered amine system compound is typical and an antifogger, an antiblocking agent, an antistatic agent, a slip inhibitor, etc. should just choose the optimal thing out of the surfactant equipped with these properties, conductive resin, etc.

[0023] In order to obtain the film made of resin for starting this invention light reflexes, a resin constituent is prepared first. A resin constituent uses 3 of the above mentioned (A) component, the (B) component, and the (C) component components as an indispensable component. The presentation ratio of indispensable 3 components considers as the (B) component 100 – the 400 weight sections to the (A) component 100 weight section, and, as for the (C) component, it is desirable to consider as 0.01 – 20 weight section to the 100 weight sections of two components of the (A) component and the (B) component. (A) The void content of the film manufactured from a resin constituent to the component 100 weight section as it is under the (B) component 100 weight section is not enough, although the void content of a film will become high and the rate of a light reflex will become high if the rate of a light reflex becomes low and the 400 weight sections are exceeded, productivity, reinforcement, etc. of a film fall and neither is desirable.

[0024] (C) If the rate of a light reflex of the film with which a component is prepared from a resin constituent as it is less than 0.01 to the 100 weight sections of two components of the (A) component and the (B) component does not improve but 20 weight sections are exceeded, the productivity of a film falls and neither is desirable. (C) Especially the desirable range of a component is 0.5 – 10 weight section.

[0025] When blending processing aid or a softener [(D) Component] with the resin constituent for film preparation for light reflexes made of resin concerning this invention, it can blend with it in the range of 0.5 – 10 weight section to the total quantity 100 weight section of the (A) component and the (B) component. (D) When blending the resin additive of others, such as a component and the (E) component, the loadings which do not spoil the purpose of this invention shall be chosen.

[0026] First, in order to prepare the resin constituent for the film manufacture for light reflexes made of resin concerning this invention, if it requires further, carry out specified quantity weighing capacity of other resin additives, such as the (D) component and the (E) component, etc. to the (A) component, the (B) component, and the (C) component, and let each component be mixture with mixers, such as a drum tumbler, a ribbon blender, a Henschel mixer, and a super mixer, with them. Subsequently, melting and kneading can be carried out with kneading equipments, such as a 1 shaft extruder, a twin screw extruder, a roll mill, and a Banbury mixer, and it can be based on the approach of pelletizing. Moreover, if the (A) component and the (C) component are beforehand mixed by the approach learned from the former and it requires for the mixture of these 2 component further with the (B) component, it is good also by mixing, melting, and the approach of kneading in other resin additives, such as the (D) component and the (E) component. In addition, the film made of resin for light reflexes applied to this invention from mixture can also be directly manufactured without pelletizing the mixture of each component.

[0027] In order to prepare the film made of resin for light reflexes concerning this invention, do

melting and kneading of the above-mentioned mixture or a pellet with an extruder, and let it be a film. In order to consider as a film, it equips with an inflation die, a T die, etc. at the tip of an extruder, it extrudes in the shape of a film from these dies, and considers as an unstretched film or the film which carried out uniaxial stretching at least successively in a lengthwise direction (the direction of taking over of a film). In an inflation-molding method, it is usually desirable to make a blow up ratio (BUR) into the range of 1.2-8.

[0028] What is necessary is to just be based on the approach learned from the former, the roll extending method, the tubular extending method, etc., in case an unstretched film is extended. Moreover, for extending, you may be any of an one-step (coincidence) extension method and two or more steps of multistage (serially) extension methods. Moreover, the unstretched film manufactured by the T die requires by performing vertical uniaxial stretching at least, and can be extended in a longitudinal direction (the direction of taking over of a film, and the direction of a right angle), and can be used as a biaxially oriented film.

[0029] Although the temperature conditions at the time of extending an unstretched film change with the class of the presentation rate of each component of a raw material resin constituent, and other additive objects, an amount, the thickness of a film, etc., it is chosen in [ of the melting point of raw material resin ] 5 degrees C or less, and draw magnification is usually chosen in the range 1.2 to 8 times each width [ length and width ] of this. In addition, if it heat-treats after extension process termination, the dimensional accuracy of the obtained oriented film can be stabilized. Thus, the oriented film obtained has the desirable thing of the range whose thickness is 20-500 microns. Furthermore, it is the thing of the range of 100-400 micro preferably. Thickness is inferior to the workability at the time of processing it into liquid crystal display back light components etc. in less than 20micro, when thicker than 500micro, it is inferior in respect of productivity, and neither is desirable.

[0030] If the film made of resin for light reflexes concerning this invention is extended to 1 shaft orientations or 2 shaft orientations, a hole will produce it in the interface of the (A) component and the (B) component. In this case, the thing of the range whose void content produced inside a film is 25 - 70% is desirable. The film made of resin for light reflexes concerning this invention can be used as a reflecting plate as a multilayer film more than the bilayer which carried out the laminating to other resin films, although it can be used as a light reflex plate as it is. Moreover, the laminating of the film made of resin for light reflexes concerning this invention is carried out to a metal plate, and it can be used as a reflecting plate. The film made of resin for light reflexes concerning this invention is used suitable for the light reflex plate of the liquid crystal display back light section, a liquid crystal display back light unit, etc.

[0031]

[Example] Hereafter, although detail explanation of this invention is given based on an example, this invention is not limited to the following written examples, unless the meaning \*\*\* exists.

[0032] Each component used for below in the example of a publication has the following properties.

(1) PE:(A) component — it is — a consistency — 0.921g/cm<sup>3</sup> and MFR — the line for 1g / 10 minutes — the low-density-polyethylene (Japan Polchem make, trade name:FW20G) 84 weight section and a consistency are [ 0.919 g/cm<sup>3</sup> and MFR ] mixture with the letter low-density-polyethylene of branching (Japan Polchem make, trade name:LF441) 16 weight section for 2g / 10 minutes.

(2) It is a PET:(A) component and intrinsic viscosity is polyethylene terephthalate of 0.71.

[0033] (3) It is a calcium-carbonate:(B) component, and to the calcium-carbonate (Japanese east powdering shrine make and trade name:NS# 1000) 100 weight section whose mean particle diameter is 1.2 micrometers, add the 1 and 2-hydroxy stearin acid (Wako Pure Chem industrial company make) 2 weight section, and perform surface treatment for 10 minutes at the temperature of 100 degrees C with a Henschel mixer.

(4) It is a barium-sulfate:(B) component and is the barium sulfate (the Sakai chemistry-ized company make, a trade name: B-55) whose mean diameter is 0.66 micrometers.

(5) It is a TSF-: [ 6000 ] (C) component and is dimethyl silicon (the GE Toshiba Silicones [ Co., Ltd. ] make, a trade name: TSF 451-6000).

[0034] (6) It is a TSF-: [ 3000] (C) component and is dimethyl silicon (the GE Toshiba Silicones [ Co., Ltd. ] make, a trade name: TSF 451-3000).

(7) It is a D-: [ 600] (D) component and is dipentaerythritol hexa octanoate (the Mitsubishi Chemical make, a trade name: D-600).

(8) It is hardening castor oil (the HOKOKU [ CORP. ] make, a trade name: caster wax HC-WX) of a hardening castor oil:(D) component.

(9) It is an ultraviolet ray absorbent:(E) component and is 2-hydroxy-4-octoxybenzophenone.

[0035] In the example given in the following, the approach of a publication estimated the obtained film next.

(a) Thickness (micrometer) : it measured by the constant-pressure type thickness gage (the Teclock Corp. make, form-G-10).

(b) Void content (%) : first, start the sample of 10cm angle from a film, and measure weight W (g) and thickness t (micrometer). Subsequently, therefore, it computed from the specific gravity rho of a resin constituent (g/cm3) to the degree type,  $1 - [W/(10 \times 10 \times t \times 0.0001 \times \rho)]$  void content (%) = [] x100. [ i.e., ]

(c) Brightness : fix a sample film to a back light unit, and measure five per each sample for the brightness on the screen with a luminance meter (the Minolta Co., Ltd. make, form:LS-100). Similarly, the brightness of the white PET sheet (the Toray Industries [, Inc. ] make, a trade name: E60) whose thickness is 188 micrometers was measured, and the relative value at the time of setting it to 100 showed. It is high brightness, so that this value is large.

[0036] [Example 1] Using the tandem-die kneading extruder, at 220 degrees C of cylinder temperatures, melting and kneading of the mixture obtained in the calcium-carbonate 167 weight section which performed surface treatment to the above-mentioned PE100 weight section, and TSF-6000 after mixing 2 weight sections and an ultraviolet ray absorbent for 2 weight sections and D-600 by the 1.2 weight section tumbler mixer to AUW 100 of PE and a calcium carbonate were carried out, and it was pelletized.

[0037] This pellet was supplied to the extruding press machine equipped with a circular die, the cylinder temperature was set as 200 degrees C, melting and after kneading and considering as a film, it extended only in the direction of taking over of a film by 2.3 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 60 degrees C, and the film made of resin of 75 micrometers in thickness and 40% of void contents for light reflexes was obtained. To the aluminium foil which oxidized the front face and made the obtained film made of resin for light reflexes the temperature of 65 degrees C, the heat lamination was carried out by the 1.5kg/cm<sup>2</sup> flow and pressure requirement, and the layered product for reflecting plates was obtained. After judging this in 280mmx220mm size, the back light unit was equipped with it, and brightness was measured. Physical properties were evaluated about the film made of resin for light reflexes, and the back light unit. An evaluation result is shown in Table -1.

[0038] In the example of a publication, replaced the addition of a calcium carbonate with the 210 weight sections and TSF-6000, and TSF-3000 were changed into the [example 2] example 1 with 2 weight sections, and also for this example, in the procedure of a publication, it considered as mixture and pelletized. With the same extruding press machine used in this example, melting and after kneading and considering as a film, it extended only in the direction of taking over of a film by 4.2 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 60 degrees C, and the film made of resin of 75 micrometers in thickness and 60% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -1.

[0039] In the example given in the [example 3] example 1, changed TSF-6000 into 4 weight sections and D-600 was changed into hardening castor oil, and also in the procedure of a publication, it considered as mixture and pelletized for this example. With the same extruding press machine used in this example, melting and after kneading and considering as a film, it extended only in the direction of taking over of a film by 2.5 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 60 degrees C, and the

film made of resin of 80 micrometers in thickness and 30% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -1.

[0040] In the example given in the [example 4] example 3, uniaxial stretching was carried out on the same conditions, and the film made of resin of 160 micrometers in thickness and 30% of void contents for light reflexes was obtained. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -1.

[0041] In the example given in the [example 5] example 3, changed PE into Above PET and it changed into the calcium-carbonate 120 weight section, and also in the procedure of a publication, it considered as mixture and pelletized for this example. From this pelletizing, at 280 degrees C of cylinder temperatures, melting and kneading were carried out and it pelletized with the same extruding press machine used in this example. With the same extruding press machine used in this example, it extended only in the direction of taking over of a film by 2.5 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 90 degrees C at 300 degrees C of cylinder temperatures after kneading and considering as a film, melting and, and the film made of resin of 70 micrometers in thickness and 40% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -1.

[0042] In the example given in the [example 6] example 3, the calcium carbonate was changed into the barium sulfate, and also in the procedure of a publication, it considered as mixture and pelletized for this example. With the same extruding press machine used in this example, melting and after kneading and considering as a film, it extended only in the direction of taking over of a film by 2.5 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 60 degrees C, and the film made of resin of 80 micrometers in thickness and 30% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -1.

[0043] The laminating of the film obtained in the example of a publication in the [example 7] example 2 and the film obtained in the example of a publication in the example 5 was carried out by the heat laminating method, and the layered product was obtained. About the obtained layered product, the same evaluation trial was performed also in the example 1. An evaluation result is shown in Table -1.

[0044]

[Table 1]

表-1

項目\番号	実施例1	実施例2	実施例3	実施例4	実施例5	実施例6	実施例7
<u>樹脂組成物</u>							
(A) 成分の種類	PE	PE	PE	PE	PET	PE	PE/PET
配合量 (重量)	100	100	100	100	100	100	100
<u>(B) 成分の種類</u>							
配合量 (重量)	167	210	167	167	120	167	積層体
(C) 成分の種類	TSP-6000	TSP-3000	HIVAC F5	HIVAC F5	HIVAC F5	HIVAC F5	積層体
配合量 (重量)	2	2	4	4	4	4	2/4
(D) 成分の種類	D-600	D-600	硬化剤	硬化剤	D-600	硬化剤	D-600
配合量 (重量)	2	2	2	2	2	2	2/2
(E) 成分 (重量)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
<u>フィルムの性質</u>							
延伸倍率 (倍)	2.3	4.2	2.5	2.5	2.3	2.5	積層体
厚さ (μm)	75	75	80	160	70	80	145
空孔率 (%)	40	60	30	30	40	30	50
輝度	107	110	103	106	105	107	112

[0045] The (C) component was not blended with the [example 1 of comparison] example 1 in the example of a publication, and also for this example, in the procedure of a publication, it considered as mixture and pelletized. With the same extruding press machine used in this example, melting and after kneading and considering as a film, it extended only in the direction of taking over of a film by 2.3 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 60 degrees C, and the film made of resin of 75 micrometers in thickness and 40% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -2.

[0046] In the example of a publication, the addition of the (C) component was changed into the [example 2 of comparison] example 1 at 25 weight sections, and also for this example, in the procedure of a publication, it considered as mixture and pelletized. Although melting and kneading of were done and film-ization was tried from this pelletizing with the same extruding press machine used in this example, it was stabilized and a film was not able to be manufactured.

[0047] In the example given in the [example 3 of comparison] example 1, in the procedure of a publication, it considered as mixture and pelletized for this example. After considering as a film in a procedure given in this example, it did not extend but the resin film of 220 micrometers in thickness and 0% of void contents was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained resin film. An evaluation result is shown in Table -2.

[0048] In the example of a publication, the calcium-carbonate addition was changed into the [example 4 of comparison] example 1 at 50 weight sections, and also for this example, in the procedure of a publication, it considered as mixture and pelletized. With the same extruding press machine used in this example, melting and after kneading and considering as a film, uniaxial stretching was increased 2.3 times between the preheating rolls and extension rolls which were heated at 60 degrees C, and the film made of resin of 75 micrometers in thickness and 20% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -2.

[0049]

[Table 2]

表-2

項目＼番号	比較例1	比較例2	比較例3	比較例4
<b>樹脂組成物</b>				
<b>(A) 成分の種類</b>	PE	PE	PE	PE
<b>配合量 (重量)</b>	100	100	100	100
<b>(B) 成分の種類</b>	触カルシウム	触カルシウム	触カルシウム	触カルシウム
<b>配合量 (重量)</b>	167	167	167	50
<b>(C) 成分の種類</b>	なし	TSP-6000	TSP-6000	TSP-6000
<b>配合量 (重量)</b>	—	25	2	2
<b>(D) 成分の種類</b>	D-600	D-600	D-600	D-600
<b>配合量 (重量)</b>	2	2	2	2
<b>(E) 成分 (重量)</b>	1.2	1.2	1.2	1.2
<b>フィルムの性質</b>				
<b>延伸倍率 (%)</b>	2.3	2.3	1.0	2.3
<b>厚さ (μm)</b>	75	—	220	75
<b>空孔率 (%)</b>	40	—	0	20
<b>輝度</b>	98	—	90	92

[0050] The following thing becomes clear from Table -1 and -2.

(1) The film made of resin of this invention for light reflexes is highly excellent in brightness

(example 1 – example 7 reference).

(2) On the other hand, the film made of resin which does not contain the mixture (C) of the silicone which makes siloxane association a frame has low brightness (example of comparison 1 reference).

(3) When there is too much mixture (C) of the silicone which makes siloxane association a frame, the film made of resin cannot be manufactured stably (example of comparison 2 reference).

(4) 25% or less of film made of resin has [ a void content ] low brightness (example 3 of comparison, and example of comparison 4 reference).

[0051]

[Effect of the Invention] this invention is as having explained to the detail above, and is as follows — doing advantageous effectiveness so specially, the utility value on the industry is size very much.

1. Since the film made of resin of this invention for light reflexes is manufactured at least from thermoplastics (A), a bulking agent (B), and the resin constituent that contains the mixture (C) of the silicone which makes siloxane association a frame as indispensable 3 components, its light reflex effectiveness is high and it demonstrates the outstanding brightness.

2. If indispensable 3 components of the mixture (C) of thermoplastics (A), a bulking agent (B), and the silicone that make siloxane association a frame are chosen in the suitable range, the film made of resin of this invention for light reflexes does not have a trouble at the time of film manufacture, and can be manufactured stably.

3. If thickness is chosen in the suitable range, the film made of resin of this invention for light reflexes does not have a trouble at the time of film manufacture, and also in case it is used for member manufacture of a liquid crystal display, it will be easy to deal with it.

4. The film made of resin of this invention for light reflexes will demonstrate Takamitsu reflective effectiveness and high brightness, if thickness and a void content are chosen in the suitable range.

5. Since light reflex effectiveness is high, the film made of resin of this invention for light reflexes is used suitable for applications, such as the member of a liquid crystal display, for example, the light reflex plate of the back light section, a light reflex member of the lamp holder section, and a back light unit.

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[Translation done.]

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**TECHNICAL FIELD**

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**[Field of the Invention]** This invention relates to the film made of resin for light reflexes. It is related with the film made of resin for light reflexes, and the film made of resin for light reflexes used especially suitable for the member of a liquid crystal display, the back light unit of a liquid crystal display, etc. in more detail.

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PRIOR ART

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[Description of the Prior Art] In recent years, the film made of resin for light reflexes is used in various fields. For example, it is used for PDA, such as television, and a personal computer, a cellular phone, and a video camera as main parts of a liquid crystal display. The thing of a small power consumption mold is liked with the thin shape by this kind of liquid crystal display. And since it considers as the thin shape, the side light method which is a transparent light guide plate and has arranged the light source horizontally is adopted. However, a part of quantity of light in which the back light unit using a light guide plate goes via a light guide plate gets across to the liquid crystal section, but when the remaining quantity of lights use a reflecting plate, it is told to the liquid crystal section. Therefore, in order to tell efficiently the quantity of light which enables small power consumption-ization of a liquid crystal display, and attains miniaturization and thin shape-ization, and is supplied from a back light unit to the liquid crystal section, the light reflex effectiveness of the film for light reflexes must be high, and desire of the film for light reflexes of high brightness is carried out.

[0003] As a conventional film made of resin for light reflexes, the light reflex film of the reflecting plate which applied white pigments on metal plates, such as aluminum, and the product made from the polyethylene terephthalate (it abbreviates to PET hereafter) sheet containing the inorganic bulking agent of white which is indicated by JP,59-8782,A is proposed as indicated by JP,2-13925,A. However, with the film for light reflexes of these proposals, since light was reflected with the pigment, sufficient light reflex effectiveness was not acquired. Moreover, the film for light reflexes which made the PET film indicated by JP,63-161029,A and the film which uses PET as a principal component extend did not have an enough light reflex in the interface of PET and a hole, although light was reflected by the hole formed at the time of extension other than the light reflex effectiveness by the pigment. moreover, the thermoplastics and the inorganic bulking agent which are indicated by JP,7-287110,A — since — the becoming porous film is superior to the thing before this. However, it could not say that light reflex effectiveness was enough, but the film for light reflexes which improved from that of light reflex effectiveness was demanded strongly.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] this invention is as having explained to the detail above, and is as follows -- doing advantageous effectiveness so specially, the utility value on the industry is size very much.

1. Since the film made of resin of this invention for light reflexes is manufactured at least from thermoplastics (A), a bulking agent (B), and the resin constituent that contains the mixture (C) of the silicone which makes siloxane association a frame as indispensable 3 components, its light reflex effectiveness is high and it demonstrates the outstanding brightness.
2. If indispensable 3 components of the mixture (C) of thermoplastics (A), a bulking agent (B), and the silicone that make siloxane association a frame are chosen in the suitable range, the film made of resin of this invention for light reflexes does not have a trouble at the time of film manufacture, and can be manufactured stably.
3. If thickness is chosen in the suitable range, the film made of resin of this invention for light reflexes does not have a trouble at the time of film manufacture, and also in case it is used for member manufacture of a liquid crystal display, it will be easy to deal with it.
4. The film made of resin of this invention for light reflexes will demonstrate Takamitsu reflective effectiveness and high brightness, if thickness and a void content are chosen in the suitable range.
5. Since light reflex effectiveness is high, the film made of resin of this invention for light reflexes is used suitable for applications, such as the member of a liquid crystal display, for example, the light reflex plate of the back light section, a light reflex member of the lamp holder section, and a back light unit.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] The purpose of this invention solves these problems and is to offer the film made of resin for light reflexes which demonstrates the further excellent light reflex effectiveness and high brightness and the member of the back light unit for liquid crystal displays, the back light unit for liquid crystal displays, etc.

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## MEANS

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[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the film made of resin for light reflexes characterized by manufacturing this invention from thermoplastics (A), a bulking agent (B), and the resin constituent that contains at least 3 components of the mixture (C) of the silicone which makes siloxane association a frame as an indispensable component is offered.

[0006]

[Embodiment of the Invention] Hereafter, this invention is explained to a detail. Let [ thermoplastics / [it may be hereafter called the (A) component for short] ] the film made of resin for light reflexes concerning this invention be a base. (A) As thermoplastics which constitutes a component, acrylic resin, such as polyolefine system resin, such as polyethylene, polypropylene, and a Polly 4-methyl pentene, polyester system resin, and polymethylacrylate, polyvinyl chloride system resin, polyvinylidene chloride system resin, fluororesin, polyether system resin, polyamide system resin, polyurethane system resin, the diene system resin represented by polybutadiene are mentioned.

[0007] The polyolefine system resin from a viewpoint and polyester system resin of the workability of a film or a sheet (it is only hereafter called a "film" for short) are desirable among the above-mentioned thermoplastics. As an example of polyolefine system resin, linearity low density polyethylene (it abbreviates to LLDPE hereafter), polypropylene (it abbreviates to PP hereafter), etc. which are the copolymer of low density polyethylene, high density polyethylene, medium density polyethylene, ethylene, and alpha olefin are mentioned, and polyethylene terephthalate (PET), polybutylene terephthalate, etc. are mentioned as an example of polyester system resin.

[0008] The following resin is desirable when the shaping stability of these thermoplastics etc. is taken into consideration. That is, when resin is LLDPE, the thing for 0.1-20g / 10 minutes has a desirable melt flow rate (MFR) in 190 degrees C and 2.16kg load. When resin is PP, the thing for 0.5-15g / 10 minutes has desirable MFR in 230 degrees C and 2.16kg load. When resin is PET, the thing of the range of 0.65-0.85 has desirable intrinsic viscosity.

[0009] (A) In case the whiteness degree of a film is raised when a resin constituent is processed into a film, and a film is extended, function [ bulking agent / which is blended with a component / [it may be hereafter called the (B) component for short] ] on a film as making a hole form. (B) As long as a component makes the suitable hole for the film after raising the whiteness degree of a film and extending form, it may be any of an inorganic bulking agent and an organic bulking agent. In addition, the part which exfoliation arose in the interface of the (A) component and the (B) component, and became a hole is said by this invention by a "hole's" carrying out melting kneading, film-izing a resin constituent, and extending this film.

[0010] As an inorganic bulking agent, a calcium carbonate, talc, clay, a kaolin, a silica, \*\*\*\*\* a magnesium carbonate, a barium carbonate, magnesium sulfate, a barium sulfate, a calcium sulfate, an aluminum hydroxide, a zinc oxide, a magnesium hydroxide, a calcium oxide, magnesium oxide, titanium oxide, an alumina, a mica, asbestos powder, glass powder, milt balun, a zeolite, \*\*\* clay, etc. can accomplish. As an organic bulking agent, cellulose system powder, such as wood flour and pulp powder, is mentioned. A calcium carbonate, a barium sulfate, titanium oxide,

a magnesium carbonate, an alumina, a magnesium hydroxide, etc. are desirable especially. Two or more kinds of these (B) components may be mixed.

[0011] (B) The thing 30 micrometers or less of a component which has small mean particle diameter is desirable, and especially its thing of the range of 0.1–10 micrometers is desirable especially. If compactness of the hole produced in an oriented film is worsened and particle size is too small, the dispersibility to a resin constituent is bad, and since the moldability of a resin constituent is also reduced, neither is desirable [ if mean particle diameter is too large, after manufacturing a film from a resin constituent, it will extend, but ].

[0012] In case the above-mentioned (B) component manufactures a film from prevention of condensation, the dispersibility to the (A) component, and a resin constituent, it is desirable that surface treatment is carried out by the finishing agent from viewpoints at the time of extending especially to at least 1 shaft orientations, such as ductility. As a finishing agent, a fatty acid or its metal salt is mentioned.

[0013] (A) Adequate supply in the blender and extruder at the time of manufacturing a film from a resin constituent is enabled, and function [ mixture / of the silicone which makes a frame siloxane association blended with a component / {it may be hereafter called the (C) component for short} ] as raising the rate of a light reflex of a film. (C) As a component, you may be any of silicone oil, silicone rubber, and silicone resin.

[0014] As an example of silicone oil, dimethylpolysiloxane (dimethyl silicone oil), What [ consists of only the siloxane structures and the alkyl groups like a poly methylphenyl siloxane and annular dimethylpolysiloxane ] The epoxy denaturation silicone oil to which the alkyl group denaturalized by various kinds of functional groups, Amino denaturation silicone oil, polyether denaturation silicone oil, Carboxyl denaturation silicone oil, alcoholic denaturation silicone oil, Methacrylic denaturation silicone oil, methyl styryl silicone oil, Fluorine denaturation silicone oil, mercapto silicone oil, methyl styryl denaturation silicone oil, higher-fatty-acid denaturation silicone oil, and methyl alkoxy denaturation silicone oil are mentioned.

[0015] As silicone rubber, the millable rubber of heating bridge formation (HTV), liquid rubber, the liquid rubber of room temperature curing (RTV), etc. are mentioned. Moreover, the copolymer of the monomers which have siloxane siloxane structures, such as a dimethylsiloxane methyl steer ROKISHI siloxane copolymer, and the denaturation silicone rubber (SEP) which denaturalized ethylene-propylene rubber by special polyorganosiloxane are mentioned. Moreover, the polymer of a trimethylsiloxy silicic acid etc. is mentioned other than usual dimethylpolysiloxane as silicone resin.

[0016] Although the resin constituent for the film manufacture for light reflexes made of resin concerning this invention contains the three above-mentioned components as an indispensable component at least, it can blend an anti-oxidant and a thermostabilizer, light stabilizer, lubricant, an antifogger, an antiblocking agent, an antistatic agent, a slip inhibitor, etc. [ ultraviolet ray absorbent / softener / the resin additive of further others, for example, processing aid, / {it may be hereafter called the (D) component for short} / {it may be hereafter called the (E) component for short} ]

[0017] Processing aid or a softener [(D) Component] is used in order to raise the workability at the time of manufacturing a film from a resin constituent. Specifically, specific ester compounds, amide compounds, the hydrocarbon polymers that have a side chain, mineral oil, and waxes are mentioned.

[0018] As long as it is the monochrome or polyester of structure which consists of alcohol and a carboxylic acid as an ester compound, the compound with which the compound which there is not and left hydroxyl and a carbonyl group end to intramolecular was also blocked in the form of an ester group is sufficient as especially a limit. Specifically, stearyl stearate, sorbitan tristearate, epoxy soybean-oil, purification castor oil, hardening castor oil, dehydrated-castor-oil, epoxy soybean-oil, extreme hardened-oil, and trimellitic acid trioctyl, ethylene glycol JIOKUTANOETO, pentaerythritol tetra-octanoate, etc. are mentioned.

[0019] As long as it is the monochrome or polyamide compound of structure which consists of an amine and a carboxylic acid as an amide compound, the compound with which the compound which there is not and left the amino group and a carbonyl group end to intramolecular was also

blocked in the form of an amide group is sufficient as especially a limit. Specifically, octadecanamide, a behenic acid amide, hexa methylenebis octadecanamide, a trimethylene bis-octylic acid amide, hexa methylenebis hydroxy octadecanamide, a trio KUTATORI merit acid amide, a distearyl urea, butylene bis-octadecanamide, xylylene bis-octadecanamide, a distearyl adipic-acid amide, a distearyl phthalic-acid amide, a distearyl OKUTADEKA diacid amide, the Epsilon caprolactams, and these derivatives are mentioned.

[0020] The thing which are the Pori alpha olefins and has a with a carbon numbers of four or more side chain as a hydrocarbon polymer which has a side chain and which is usually classified into oligomer is desirable. Specifically The copolymer and its maleic-acid derivative of an ethylene-propylene For example, (the Mitsui Petrochemical Industries, Ltd. make and trade name:roux cant), the polymer of an isobutylene For example, (the Idemitsu petrochemical-industry company make, trade name:polybutene HV-100), The oligomer of a butadiene and an isoprene and its water garnish, the polymerization object of 1-hexene, The derivative and hydroxy polybutadiene which are guided from the polymerization object of polystyrene and these, the water garnish, an end hydroxy polybutadiene water garnish (for example, the Mitsubishi Chemical make, a trade name: polytail HA), etc. are mentioned. A liquid paraffin, paraffin wax, etc. are mentioned as mineral oil.

[0021] Generally an ultraviolet ray absorbent [(E) Component] is chosen from a salicylic-acid system, a benzophenone system, or a benzotriazol system ultraviolet ray absorbent. As a salicylic-acid system ultraviolet ray absorbent, a phenyl SARISHI rate, a p-t-butylphenyl SARISHI rate, p-octyl phenyl SARISHI rate, etc. are mentioned. As a benzophenone system ultraviolet ray absorbent, 2, 4-dihydroxy benzophenone, 2-hydroxy-4-methoxybenzophenone, 2-hydroxy-4-octoxybenzophenone, 2, 2'-dihydroxy-4-methoxybenzophenone, etc. are mentioned. As a benzotriazol system ultraviolet ray absorbent, 2-(2'-hydroxy-5'-methylphenyl) benzotriazol, 2-(2'-5'-t-butylphenyl) benzotriazol, etc. are mentioned. An ultraviolet ray absorbent is not limited to what was these-illustrated.

[0022] As an anti-oxidant, a mono-phenol system, a bisphenol system, a macromolecule mold phenolic antioxidant, a sulfur system anti-oxidant, the Lynn system anti-oxidant, etc. are mentioned. As light stabilizer, a hindered amine system compound is typical and an antifogger, an antiblocking agent, an antistatic agent, a slip inhibitor, etc. should just choose the optimal thing out of the surfactant equipped with these properties, conductive resin, etc.

[0023] In order to obtain the film made of resin for starting-this invention light reflexes, a resin constituent is prepared first. A resin constituent uses 3 of the above mentioned (A) component, the (B) component, and the (C) component components as an indispensable component. The presentation ratio of indispensable 3 components considers as the (B) component 100 - the 400 weight sections to the (A) component 100 weight section, and, as for the (C) component, it is desirable to consider as 0.01 - 20 weight section to the 100 weight sections of two components of the (A) component and the (B) component. (A) The void content of the film manufactured from a resin constituent to the component 100 weight section as it is under the (B) component 100 weight section is not enough, although the void content of a film will become high and the rate of a light reflex will become high if the rate of a light reflex becomes low and the 400 weight sections are exceeded, productivity, reinforcement, etc. of a film fall and neither is desirable.

[0024] (C) If the rate of a light reflex of the film with which a component is prepared from a resin constituent as it is less than 0.01 to the 100 weight sections of two components of the (A) component and the (B) component does not improve but 20 weight sections are exceeded, the productivity of a film falls and neither is desirable. (C) Especially the desirable range of a component is 0.5 - 10 weight section.

[0025] When blending processing aid or a softener [(D) Component] with the resin constituent for film preparation for light reflexes made of resin concerning this invention, it can blend with it in the range of 0.5 - 10 weight section to the total quantity 100 weight section of the (A) component and the (B) component. (D) When blending the resin additive of others, such as a component and the (E) component, the loadings which do not spoil the purpose of this invention shall be chosen.

[0026] First, in order to prepare the resin constituent for the film manufacture for light reflexes

made of resin concerning this invention, if it requires further, carry out specified quantity weighing capacity of other resin additives, such as the (D) component and the (E) component, etc. to the (A) component, the (B) component, and the (C) component, and let each component be mixture with mixers, such as a drum tumbler, a ribbon blender, a Henschel mixer, and a super mixer, with them. Subsequently, melting and kneading can be carried out with kneading equipments, such as a 1 shaft extruder, a twin screw extruder, a roll mill, and a Banbury mixer, and it can be based on the approach of pelletizing. Moreover, if the (A) component and the (C) component are beforehand mixed by the approach learned from the former and it requires for the mixture of these 2 component further with the (B) component, it is good also by mixing, melting, and the approach of kneading in other resin additives, such as the (D) component and the (E) component. In addition, the film made of resin for light reflexes applied to this invention from mixture can also be directly manufactured without pelletizing the mixture of each component.

[0027] In order to prepare the film made of resin for light reflexes concerning this invention, do melting and kneading of the above-mentioned mixture or a pellet with an extruder, and let it be a film. In order to consider as a film, it equips with an inflation die, a T die, etc. at the tip of an extruder, it extrudes in the shape of a film from these dies, and considers as an unstretched film or the film which carried out uniaxial stretching at least successively in a lengthwise direction (the direction of taking over of a film). In an inflation-molding method, it is usually desirable to make a blow up ratio (BUR) into the range of 1.2-8.

[0028] What is necessary is to just be based on the approach learned from the former, the roll extending method, the tubular extending method, etc., in case an unstretched film is extended. Moreover, for extending, you may be any of an one-step (coincidence) extension method and two or more steps of multistage (serially) extension methods. Moreover, the unstretched film manufactured by the T die requires by performing vertical uniaxial stretching at least, and can be extended in a longitudinal direction (the direction of taking over of a film, and the direction of a right angle), and can be used as a biaxially oriented film.

[0029] Although the temperature conditions at the time of extending an unstretched film change with the class of the presentation rate of each component of a raw material resin constituent, and other additive objects, an amount, the thickness of a film, etc., it is chosen in [ of the melting point of raw material resin ] 5 degrees C or less, and draw magnification is usually chosen in the range 1.2 to 8 times each width [ length and width ] of this. In addition, if it heat-treats after extension process termination, the dimensional accuracy of the obtained oriented film can be stabilized. Thus, the oriented film obtained has the desirable thing of the range whose thickness is 20-500 microns. Furthermore, it is the thing of the range of 100-400micro preferably. Thickness is inferior to the workability at the time of processing it into liquid crystal display back light components etc. in less than 20micro, when thicker than 500micro, it is inferior in respect of productivity, and neither is desirable.

[0030] If the film made of resin for light reflexes concerning this invention is extended to 1 shaft orientations or 2 shaft orientations, a hole will produce it in the interface of the (A) component and the (B) component. In this case, the thing of the range whose void content produced inside a film is 25 - 70% is desirable. The film made of resin for light reflexes concerning this invention can be used as a reflecting plate as a multilayer film more than the bilayer which carried out the laminating to other resin films, although it can be used as a light reflex plate as it is. Moreover, the laminating of the film made of resin for light reflexes concerning this invention is carried out to a metal plate, and it can be used as a reflecting plate. The film made of resin for light reflexes concerning this invention is used suitable for the light reflex plate of the liquid crystal display back light section, a liquid crystal display back light unit, etc.

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[Translation done.]

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- 2.\*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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**EXAMPLE**

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[Example] Hereafter, although detail explanation of this invention is given based on an example, this invention is not limited to the following written examples, unless the meaning \*\*\*\* exists.

[0032] Each component used for below in the example of a publication has the following properties.

(1) PE:(A) component -- it is -- a consistency — 0.921g/cm<sup>3</sup> and MFR -- the line for 1g / 10 minutes — the low-density-polyethylene (Japan Polchem make, trade name: FW20G) 84 weight section and a consistency are [ 0.919 g/cm<sup>3</sup> and MFR ] mixture with the letter low-density-polyethylene of branching (Japan Polchem make, trade name: LF441) 16 weight section for 2g / 10 minutes.

(2) It is a PET:(A) component and intrinsic viscosity is polyethylene terephthalate of 0.71.

[0033] (3) It is a calcium-carbonate:(B) component, and to the calcium-carbonate (Japanese east powdering shrine make and trade name: NS# 1000) 100 weight section whose mean particle diameter is 1.2 micrometers, add the 1 and 2-hydroxy stearin acid (Wako Pure Chem industrial company make) 2 weight section, and perform surface treatment for 10 minutes at the temperature of 100 degrees C with a Henschel mixer.

(4) It is a barium-sulfate:(B) component and is the barium sulfate (the Sakai chemistry-ized company make, a trade name: B-55) whose mean diameter is 0.66 micrometers.

(5) It is a TSF-: [ 6000 ] (C) component and is dimethyl silicon (the GE Toshiba Silicones [ Co., Ltd. ] make, a trade name: TSF 451-6000).

[0034] (6) It is a TSF-: [ 3000 ] (C) component and is dimethyl silicon (the GE Toshiba Silicones [ Co., Ltd. ] make, a trade name: TSF 451-3000).

(7) It is a D-: [ 600 ] (D) component and is dipentaerythritol hexa octanoate (the Mitsubishi Chemical make, a trade name: D-600).

(8) It is hardening castor oil (the HOKOKU [ CORP. ] make, a trade name: caster wax HC-WX) of a hardening castor oil:(D) component.

(9) It is an ultraviolet ray absorbent:(E) component and is 2-hydroxy-4-octoxybenzophenone.

[0035] In the example given in the following, the approach of a publication estimated the obtained film next.

(a) Thickness (micrometer) : it measured by the constant-pressure type thickness gage (the Teclock Corp. make, form:G-10).

(b) Void content (%) : first, start the sample of 10cm angle from a film, and measure weight W (g) and thickness t (micrometer). Subsequently, therefore, it computed from the specific gravity rho of a resin constituent (g/cm<sup>3</sup>) to the degree type, 1-[W/(10x10xtx0.0001xrho)]/void content (%) = [] x100. [ i.e., ]

(c) Brightness : fix a sample film to a back light unit, and measure five per each sample for the brightness on the screen with a luminance meter (the Minolta Co., Ltd. make, form: LS-100).

Similarly, the brightness of the white PET sheet (the Toray Industries [ , Inc. ] make, a trade name: E60) whose thickness is 188 micrometers was measured, and the relative value at the time of setting it to 100 showed. It is high brightness, so that this value is large.

[0036] [Example 1] Using the tandem-die kneading extruder, at 220 degrees C of cylinder temperatures, melting and kneading of the mixture obtained in the calcium-carbonate 167 weight

section which performed surface treatment to the above-mentioned PE100 weight section, and TSF-6000 after mixing 2 weight sections and an ultraviolet ray absorbent for 2 weight sections and D-600 by the 1.2 weight section tumbler mixer to AUW 100 of PE and a calcium carbonate were carried out, and it was pelletized.

[0037] This pellet was supplied to the extruding press machine equipped with a circular die, the cylinder temperature was set as 200 degrees C, melting and after kneading and considering as a film, it extended only in the direction of taking over of a film by 2.3 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 60 degrees C, and the film made of resin of 75 micrometers in thickness and 40% of void contents for light reflexes was obtained. To the aluminium foil which oxidized the front face and made the obtained film made of resin for light reflexes the temperature of 65 degrees C, the heat lamination was carried out by the 1.5kg/cm<sup>2</sup> flow and pressure requirement, and the layered product for reflecting plates was obtained. After judging this in 280mmx220mm size, the back light unit was equipped with it, and brightness was measured. Physical properties were evaluated about the film made of resin for light reflexes, and the back light unit. An evaluation result is shown in Table -1.

[0038] In the example of a publication, replaced the addition of a calcium carbonate with the 210 weight sections and TSF-6000, and TSF-3000 were changed into the [example 2] example 1 with 2 weight sections, and also for this example, in the procedure of a publication, it considered as mixture and pelletized. With the same extruding press machine used in this example, melting and after kneading and considering as a film, it extended only in the direction of taking over of a film by 4.2 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 60 degrees C, and the film made of resin of 75 micrometers in thickness and 60% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -1.

[0039] In the example given in the [example 3] example 1, changed TSF-6000 into 4 weight sections and D-600 was changed into hardening castor oil, and also in the procedure of a publication, it considered as mixture and pelletized for this example. With the same extruding press machine used in this example, melting and after kneading and considering as a film, it extended only in the direction of taking over of a film by 2.5 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 60 degrees C, and the film made of resin of 80 micrometers in thickness and 30% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -1.

[0040] In the example given in the [example 4] example 3, uniaxial stretching was carried out on the same conditions, and the film made of resin of 160 micrometers in thickness and 30% of void contents for light reflexes was obtained. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -1.

[0041] In the example given in the [example 5] example 3, changed PE into Above PET and it changed into the calcium-carbonate 120 weight section, and also in the procedure of a publication, it considered as mixture and pelletized for this example. From this pelletizing, at 280 degrees C of cylinder temperatures, melting and kneading were carried out and it pelletized with the same extruding press machine used in this example. With the same extruding press machine used in this example, it extended only in the direction of taking over of a film by 2.5 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 90 degrees C at 300 degrees C of cylinder temperatures after kneading and considering as a film, melting and, and the film made of resin of 70 micrometers in thickness and 40% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -1.

[0042] In the example given in the [example 6] example 3, the calcium carbonate was changed into the barium sulfate, and also in the procedure of a publication, it considered as mixture and pelletized for this example. With the same extruding press machine used in this example, melting

and after kneading and considering as a film, it extended only in the direction of taking over of a film by 2.5 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 60 degrees C, and the film made of resin of 80 micrometers in thickness and 30% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -1.

[0043] The laminating of the film obtained in the example of a publication in the [example 7] example 2 and the film obtained in the example of a publication in the example 5 was carried out by the heat laminating method, and the layered product was obtained. About the obtained layered product, the same evaluation trial was performed also in the example 1. An evaluation result is shown in Table -1.

[0044]

[Table 1]

表-1

項目\番号	実施例1	実施例2	実施例3	実施例4	実施例5	実施例6	実施例7
<b>樹脂組成物</b>							
(A) 成分の種類	PE	PE	PE	PE	PET	PE	PE/PET
配合量 (重量)	100	100	100	100	100	100	100
<b>(B) 成分の種類</b>							
配合量 (重量)	167	210	167	167	120	167	積層体
(C) 成分の種類	TSF-6000	TSF-3000	HIVAC F5	HIVAC F5	HIVAC F5	HIVAC F5	積層体
配合量 (重量)	2	2	4	4	4	4	2/4
(D) 成分の種類	D-600	D-600	硬化剤	硬化剤	D-600	硬化剤	D-600
配合量 (重量)	2	2	2	2	2	2	2/2
(E) 成分 (重量)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
<b>フィルムの性質</b>							
延伸倍率 (E)	2.3	4.2	2.5	2.5	2.3	2.5	積層体
厚さ (μ)	75	75	80	160	70	80	145
空孔率 (%)	40	60	30	30	40	30	50
輝度	107	110	103	106	105	107	112

[0045] The (C) component was not blended with the [example 1 of comparison] example 1 in the example of a publication, and also for this example, in the procedure of a publication, it considered as mixture and pelletized. With the same extruding press machine used in this example, melting and after kneading and considering as a film, it extended only in the direction of taking over of a film by 2.3 times as many draw magnification as this between the preheating rolls and extension rolls which were heated at 60 degrees C, and the film made of resin of 75 micrometers in thickness and 40% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -2.

[0046] In the example of a publication, the addition of the (C) component was changed into the [example 2 of comparison] example 1 at 25 weight sections, and also for this example, in the procedure of a publication, it considered as mixture and pelletized. Although melting and kneading of were done and film-ization was tried from this pelletizing with the same extruding press machine used in this example, it was stabilized and a film was not able to be manufactured.

[0047] In the example given in the [example 3 of comparison] example 1, in the procedure of a publication, it considered as mixture and pelletized for this example. After considering as a film in a procedure given in this example, it did not extend but the resin film of 220 micrometers in thickness and 0% of void contents was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained resin film. An evaluation result is shown in Table -2.

[0048] In the example of a publication, the calcium-carbonate addition was changed into the [example 4 of comparison] example 1 at 50 weight sections, and also for this example, in the procedure of a publication, it considered as mixture and pelletized. With the same extruding

press machine used in this example, melting and after kneading and considering as a film, uniaxial stretching was increased 2.3 times between the preheating rolls and extension rolls which were heated at 60 degrees C, and the film made of resin of 75 micrometers in thickness and 20% of void contents for light reflexes was obtained from this pelletizing. The evaluation trial was similarly performed about the obtained film made of resin for light reflexes. An evaluation result is shown in Table -2.

[0049]

[Table 2]

表-2

項目＼番号	比較例1	比較例2	比較例3	比較例4
<b>樹脂組成物</b>				
(A) 成分の種類	P E	P E	P E	P E
配合量 (重量)	1 0 0	1 0 0	1 0 0	1 0 0
<b>(B) 成分の種類</b>				
配合量 (重量)	1 6 7	1 6 7	1 6 7	5 0
(C) 成分の種類	なし	TSF-6000	TSF-6000	TSF-6000
配合量 (重量)	—	2 5	2	2
(D) 成分の種類	D-600	D-600	D-600	D-600
配合量 (重量)	2	2	2	2
(E) 成分 (重量)	1. 2	1. 2	1. 2	1. 2
<b>フィルムの性質</b>				
延伸倍率 (倍)	2. 3	2. 3	1. 0	2. 3
厚さ (μm)	7 5	—	2 2 0	7 5
空孔率 (%)	4 0	—	0	2 0
輝度	9 8	—	9 0	9 2

[0050] The following thing becomes clear from Table -1 and -2.

(1) The film made of resin of this invention for light reflexes is highly excellent in brightness (example 1 – example 7 reference).

(2) On the other hand, the film made of resin which does not contain the mixture (C) of the silicone which makes siloxane association a frame has low brightness (example of comparison 1 reference).

(3) When there is too much mixture (C) of the silicone which makes siloxane association a frame, the film made of resin cannot be manufactured stably (example of comparison 2 reference).

(4) 25% or less of film made of resin has [ a void content ] low brightness (example 3 of comparison, and example of comparison 4 reference).

[Translation done.]